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STOCK MARKET VOLATILITY AT THE NAIROBI SECURITIES EXCHANGE: THE ROLE OF
HERDING BEHAVIOUR

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ABSTRACT

Herding is an important factor in determining equity returns during periods of price fluctuations in the market. Increased herding behaviour among investors as a result of uncertainty causes unnecessary volatility. Therefore, this paper investigates whether herding behaviour contributes to stock market volatility at the Nairobi Securities Exchanges (NSE). First, the study evaluates whether herding behaviour exists at the NSE and the extent of such behaviour. Secondly, it explores its attributed implication on the stock market indicators demonstrating volatility. The study has utilized monthly data from firms listed in the NSE from January 2009 to December 2015. Cross Sectional Standard Deviation (CSSD) has been mainly employed as testing methodology. Panel data on individual variables was used to estimate the non- linear model of both binary and continuous nature. Coefficients by the model have statistical significant influence on CSSD confirming the presence of significant herding patterns at the NSE which influence volatility as demonstrated in the graphical analysis and consequently firm performance. In order to have proper market stability which is appealing to retail and corporate investors, the findings suggest that stock market players including the government should critically consider providing both private and public information on retail and institutional investors. The government need to stabilize market prices to retain public confidence through provision of timely and accurate information of stock markets. Continuous herding behaviour by investors may spur unnecessary volatility which is likely to destabilise the market and increase the fragility of financial system especially in developing economies.

Keywords: Herding Behaviour, Stock Market, Volatility, Cross Sectional Standard Deviation and Cross Sectional Absolute Deviation.

Introduction

A predisposition of people to keep interest in what others are doing and at times following them by overlooking their own analytical skills contributes to herding. Herding behaviour is an obvious intent by investors to copy the behaviour of other investors. In a stock market, herding does not automatically involve irrational behaviour because there are many circumstances in which investors amend their behaviour in a rational way as a response to perceived social pressure (Rook, 2006). An important investment implication of herding is that when investing in an economy where participants tend to herd around the market consensus, one needs a larger number of securities to achieve the same degree of diversification than in an otherwise normal market where there is no herding.

Furthermore, in a market where investors herd under certain, identifiable state of certain key market variables, stock prices would stop reflecting values of businesses which would lead to speculative trading and thus market volatility. Walter and Weber (2006) and Kremer and Nautz (2012) showed that empirical herding measures can be severely affected by data frequency. This inadequacy of frequent trading data also impedes the analysis of the price impact of herding especially in developing countries. Since there is no resolution on, say, intra-quarter covariance of trades and returns, it remains unclear whether institutions are reacting to or causing stock price movements.

The stock markets in Africa and particularly in Kenya are still developing; herding behaviour

seems very likely to exist in Kenya stock market from the experience of Initial Public Offering (IPO) oversubscriptions and the stock index turbulence during the political regime changeovers and other related political activities. This led to increased uncertainty and sporadically volatile stock market. Thus, for local and international fund managers, institutional investors and other individual investors, it is crucial to recognize the potential risks which may arise from these market anomalies and imperfections, in order to determine the right investment strategy. Nonetheless, while there is vast research concerning herding behaviour in developed stock markets, there is limited research on herding behaviour in developing financial markets and in particular the African countries and how it related to the market stability. Thus, this study attempts to fill the gap by investigating how the presence of herding modify the distribution of returns and whether it has a link between stock order flows and price variability.

In recognition of this focus, this study's overall objective was to evaluate the existence of herding behaviour in the Nairobi Securities Exchanges (NSE) and whether it contributes to market volatility. Consequently, the study findings do provide the necessary information on what investment managers should look for in a volatile stock market when providing guidance to their clients in constructing optimal portfolios. The Nairobi Securities Exchange (NSE) which is the subject of this study had 57 firms listed as at December 2015 and the NSE 20 Share Index is used as an overall indicator of market volatility. The Index incorporates all the traded shares of the day. It therefore reflects the overall capitalization in the market rather than the price movements of select counters (NSE, 2013). The market is indeed a full service securities exchange which supports trading, clearing and settlement of equities, debt, derivatives and other associated instruments.

Literature Review

Herding behaviour in a stock market is more of an irrational investor response rather than rational decision-making with investors imitating the actions of others rather than

trusting their own evaluation of the situation. In other words, when investors follow herds they show a willingness to downplay the importance of their own information and evaluation in favour of the aggregate market consensus (Chang *et. al.*, 2000). Herding behaviour may result in more optimistically biased earnings estimates and reduced perceptions of risk. Consequently, investors may earn abnormally low stock returns because of this misperception and the associated increased volatility and thus uncertainty about earning streams.

For market participants who follow past stock performance trends, they may experience the volatility of returns which might be aggravated and therefore a financial system that might be destabilized especially during a crisis period (Demirer and Kutun, 2006; Hadiwibowo, 2010). Therefore, past information of the investment trend by other investors is fairly useful for a new investor to make a current investment decision (Ferruz *et. al.*, 2008). This tendency is supposed to be strongest during a period of high market uncertainty. Indeed in the process of asset pricing, herding may cause stock prices to deviate from their fundamental values forcing investors to trade at inefficient prices (Raja and Selvam, 2011).

There are some theories elucidating the aspect of institutional and corporate investment. The Modern Portfolio Theory (MPT) attempts to maximize portfolio expected return for a given amount of portfolio risk or equivalently minimize risk for a given level of expected return by carefully choosing the proportions of various assets. Despite this theory widely used in practice in the financial industry, its basic assumptions have been widely challenged. Similarly, prospect theory explains the apparent regularity in human behaviors when assessing risk under uncertainty. It postulates that human beings are not consistently risk-averse; rather they are risk-averse in gains but risk-takers in losses. Nevertheless, wealth maximization is between gains and losses rather than over the final wealth position. As such, people may make different choices in situations with identical final wealth levels. However, critical to the value maximization is the reference point from which gains and losses are measured. Therefore, the status quo

is taken as the reference point and changes are measured against it in relative terms, rather than in absolute terms. Considering the theory of judgment under uncertainty, human beings have the tendency to feel the pain or the fear of regret at having made errors. As such, to avoid the pain of regret, people tend to alter their behavior, which may end up being irrational at times (Shiller, 1995).

On the other hand, capital asset pricing model (CAPM) emphasizes on compensation of investors through risk and time value of money. This theory has been criticized by scholars because of unrealistic assumptions which cannot be relied and its difficultness to test its validity. However, the framework is meant to determine the expected return for risky assets. According to signalling theory firms that make profits do provide better information to the market (Bini *et al.*, 2011). This theory however was modified and developed a job-market signalling model whereby potential employees send a signal to the employer by acquiring certain education credentials on the assumption that the credentials show a positive relationship with the ability to deliver. In this theory, managers of IPO firms strive in revealing the firm's value to outsiders through favourable information so as to maximise the share price. Companies with good future perspectives and higher possibilities of success need to send clear signals to the market when going public. Empirical literature on institutional herding does illustrate a positive association between herding and returns at short horizons. In particular, Sias (2004) found that stocks that institutions herd into (and out of) exhibit positive (negative) abnormal returns at horizons of a few quarters. When examining the long-term impact of institutional herding, however, a few recent studies found evidence of a negative association between institutional trading and long-term returns. For example, Dasgupta *et al.*, (2010) analysed the long-term future returns of stocks that have been persistently bought or sold by institutions over several quarters. They found that, in the long term, stocks persistently bought by institutions underperform stocks persistently sold by them. Evidence of long-term return reversals associated with institutional trading can also be found in Frazzini and Lamont (2008),

Gutierrez and Kelley (2009) and Brown *et al.*, (2009). Similarly, Dasgupta, *et al.*, (2010) conducted a study on the price impact of institutional herding. The findings showed that institutional herding positively predicts short-term returns but negatively predicts long-term returns and that institutional herding is stabilizing in the short-term but destabilizing in the long-term. Puckett and Yan (2005) carried out a study on short-term institutional herding and its impact on stock prices in the US. Using the trades of 776 institutional investors from 1999 to 2004, the study examined the existence and impact of short-term institutional herding. The study reported robust evidence of herding at the weekly frequency using the Lakonishok *et al.*, (1992) measure and the Sias (2004) measure. The study findings indicated that these weekly herds significantly affect the efficiency of security prices.

Hwang (2000) documented that there is a positive relationship between cross-sectional volatility of market return and time series volatility. So decrease in cross-sectional standard deviation of returns does not necessarily imply presence of herding behavior but it may be explained by decrease in uncertainty of market return. From other hand, these approaches do not account for the effect of changes in fundamental variables, so do not distinguish spurious herding from intentional one (Bikchandani and Sharma, 2001). In addition, there is no strict guideline in which values of the market return must be considered as extreme. Also herding behavior is not necessary observable only in periods of market stress; it might be also recognizable in sufficiently quiet periods when herding drives reallocation of funds in the market toward particular industry, which does not reflect in significant change in market index. So identification herding only in periods of market stress leads us to miss some important part herding behavior. So results attained by Demirer *et al.*, (2007) for Ukraine might be doubtful.

Gutierrez and Kelley (2009) conducted a study on institutional herding and future stock returns. The study was conducted in US between longer run stock returns and institutional herding from 1980 to 2005. The study concludes that herding promotes price

discovery and helps adjust prices to their intrinsic levels. That is, they find herding to correctly predict stock returns in the coming months. In contrast, two to three years after the herding, the study finds that stocks with buy herds realize negative abnormal returns. This longer run reversal in returns is robust across sub periods and performance metrics and impedes the interpretation of herding as solely promoting price discovery. The performances of the herding and non-herding institutions are less clear.

On the sell side, however, herding does not explain future abnormal returns. In a comprehensive study of trading activity using a Finnish data set, Grinblatt and Keloharju (2001) confirm a disposition effect. They also show that there are reference price effects in that individuals are more likely to sell if the stock price attains a past month high. A particularly elegant test of disposition and reference price effects is provided by Kaustia (2004) in the context of IPO markets. Since the offer price is a common purchase price, the disposition effect is clearly identifiable. Kaustia (2004) finds that volume is lower if the stock price is below the offer price, and that there is a sharp upsurge in volume when the price surpasses the offer price for the first time. Furthermore, there is also a significant increase in volume if the stock achieves new maximum and minimum stock prices, again suggesting evidence of reference price effects. Waweru *et al.*, (2008) investigated the role of behavioral finance and investor psychology in investment decision-making at the Nairobi Securities Exchange (NSE) with special reference to institutional investors. The study established that behavioral factors such as representativeness, overconfidence, anchoring, gambler's fallacy, availability bias, loss aversion, regret aversion and mental accounting affected the decisions of the institutional investors operating at the NSE. Moreover, these investors made reference to the trading activity of the other institutional investors and often exhibited an institutional-herding behavior in their investment decision-making. These trading cycles have been influencing the NSE stock index depending on

the trading volumes. These trading cycles have not been investigated as to the root cause of the cycles in terms of the behavioural tendencies underlying the cycles (Kayalidere, 2013). Behavioural economics being a recent phenomenon in African economics, there have been limited studies in the area of herding behaviour of stock traders in Africa and hence such a study is required in Kenya to understand whether stock traders trade as a herd or there exists some few differences. Herding behaviour in Nairobi Stock Exchange may be more pronounced than its occurrence in developed markets and this relates to volatility of stock markets due to abnormal market movements. However, Chang, *et.al*, (2000) argues that such behaviour may move the securities away from their price equilibrium and lead to abnormal volatility in the markets.

Methodology

A mixed research design has been used in this study. The study adopts both cross sectional design as well as correlational design. The design is cross sectional because the scope will involve various companies listed in the Nairobi Securities Exchange (NSE). The design is also correlational because the study is designed to disclose relationship between herding behaviour and various NSE stock indicators. Secondary panel data for the period (2009-2015) which is average monthly data was used. It was obtained from the records of the Nairobi Securities Exchange. Note that literature on herding has been severely handicapped by the unavailability of appropriate data which should be both, high-frequency and investor-specific. Typically, the positions taken by institutions for example on the stock market are published infrequently. Literature suggests cross sectional standard deviations (CSSD) as a testing methodology among individual firm returns within a particular group of securities. Christie and Huang (1995) use CSSD as a measure of the average proximity of individual asset returns to the realized market average in order to test herding behaviour. Cross-sectional standard

deviation (CSSD) is used to measure return dispersion and the econometric model

$$CSSD_t = \sqrt{\frac{\sum_{i=1}^N (r_{i,t} - r_{p,t})^2}{N-1}} \quad (1)$$

Where N is the number of firms in the aggregate market portfolio, $r_{i,t}$ is the observed stock return on firm i for month t and $r_{p,t}$ is the cross-sectional average of the N returns in the market portfolio for month t . This measure can be regarded as a proxy to individual security return dispersion around the market average. Therefore, the presence of herding behaviour would lead security returns not to deviate far from the overall market return. The rationale behind this argument based on the methodology is that the assumption that individuals suppress their own beliefs and make investment decisions based solely on the collective actions of the market. It is suggested that the presence of herd behaviour is most likely to occur during periods of extreme market movements, as they would most likely tend to go with the market consensus during such periods. Hence, cross sectional standard deviation is proposed to examine the

formulated is as follows:

behaviour of the dispersion measure in (1) during periods of market stress. As herd formation indicates conformity with market consensus, the presence of negative and statistically significant coefficients for down markets and for up markets which indicate herd formation by market participants. Against this background, the study used this specified econometric model.

Findings

Descriptive Analysis

The descriptive statistics under considerations are mean, standard deviation, minimum and maximum. From Table 1, NSE 20 share index ranged between the lows of 2475 and highs of 5774 points respectively with a mean of 4191 points while the cross sectional standard deviation had 0.985 on average of price is 69.26 Kenya shillings among other stock market indicators as can be observed.

Table 1: Summary Statistics

VARIABLES	Obs	Mean	SD	Min	Max
NSE 20 share Index	4788	4191.1	789.9	2474.8	5774.3
Stock Price	4033	69.3	82.9	1.49	575.8
CSSD	4788	0.985	1.423	-1.25	10.12
Where; NSE = Nairobi Securities exchange and CSSD = cross-sectional standard deviation.					

Establishing Existence of Volatility and Herding at the NSE

Graphical/Trend analysis

The study explored the presence and the nature of horde intermittent movements among firms under study. The study adopted diverse graphical illustrations in demonstrating the trend of volatility and herding over the study period. It is revealed that the trend of CSSD is constantly fluctuating. Studies including Thermozhi and

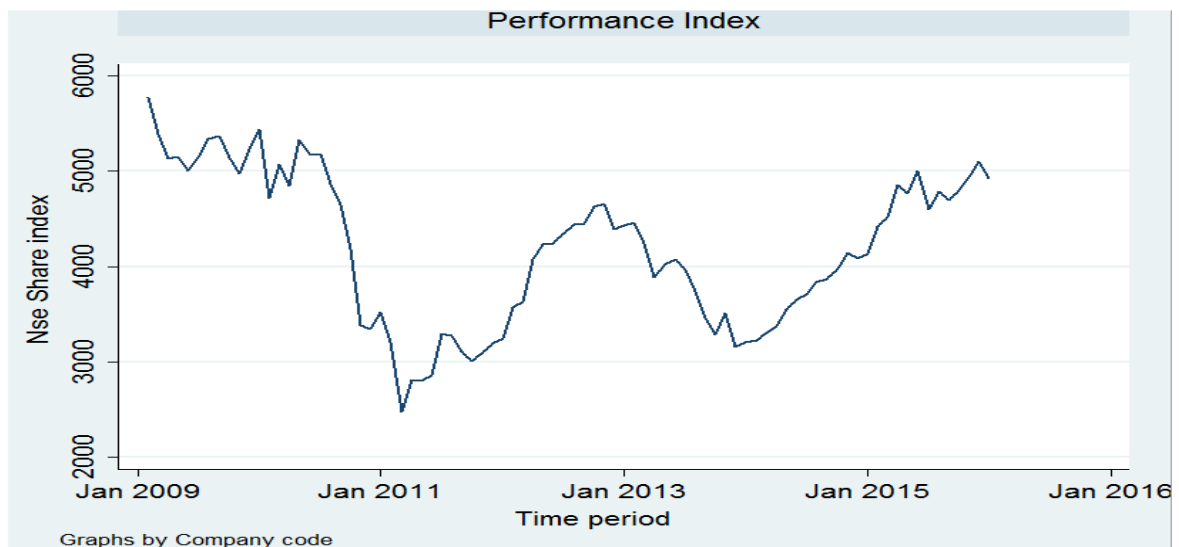
Chandra (2013) revealed that herding or such fluctuations can be caused by a host of factors including information contained in news, financial performance of the organization and investor behaviours. On the other hand, when we review other sources of stock market changes indicating herding, Kaniel et al (2008) makes an assumption that investors are irrational supporting earlier claims by other researchers in the literature. They further argue that due to this behaviour of irrationality and emotion based decisions, it affects other stock market parameters like stock price movement.

NSE 20 share index has been assessed as an indicator which has been used for a long period of time to inform performance levels of firms listed at the NSE. This is a price weight index where its members are selected based on weighted market performance for a period of twelve months. This index as well focuses mainly on the price changes amongst those companies. The NSE 20 share index has been averaged monthly and show volatility over the

entire time period which may be attributed to herding behaviour. On Figure 1, a systematic fluctuation is observed. It is a stock market indicator which shows how prices keep changing or varying contributing to volatility

in the market. As mentioned earlier even from the literature, they may have harmful effects to investors who intend to enter the market. It as well could lead to low confidence in stock market.

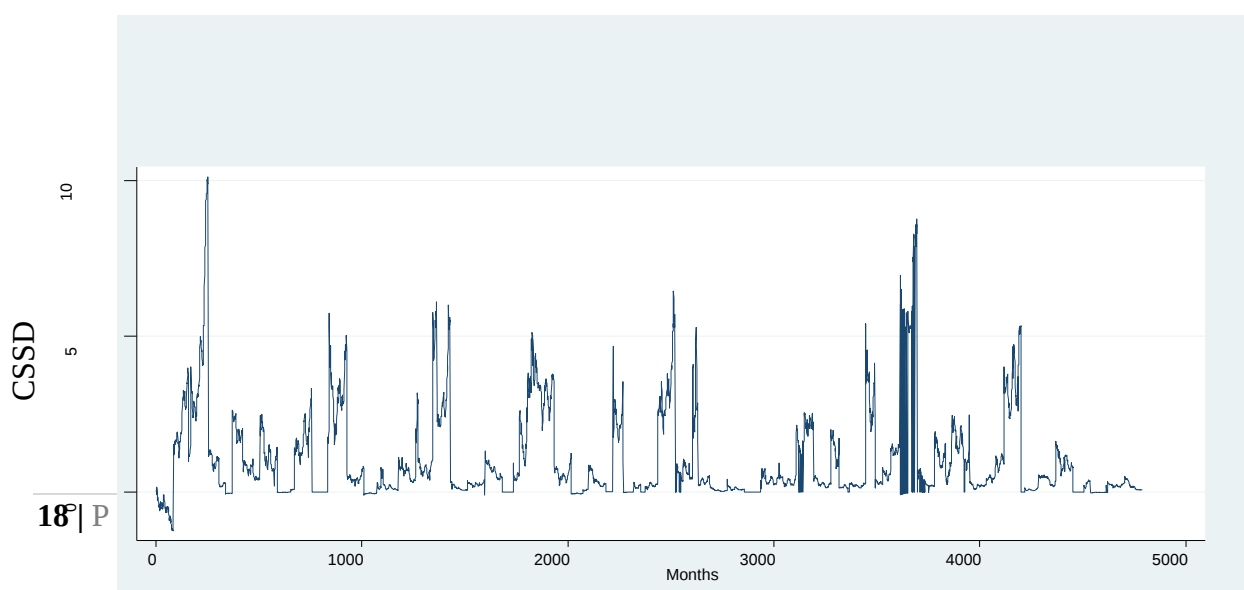
Figure 1: Graph of NSE over Time



From the Figures 2 below, we observe the kind of herding characterised by changes in the stock market parameters that are as a result of unique circumstances of that specific indicator as opposed to the overall market. This

unexceptional characteristic or behaviour can be reduced or eliminated. The graph of CSSD against time reveals significant herding throughout the entire time period for all the firms.

Figure 2: Graph of Cross Sectional Standard Deviation over Time



Existence of herding may have implications for asset pricing models since it has a behavioural effect on stock price movements

Econometric Analysis

In estimating the significance of herding, the study adopted the two suggested models. In the first model, the Cross Sectional Standard Deviation (CSSD) as used in the literature by Christie and Huang (1995) and Demirer and Kutan (2006) demonstrates the existence of herding. The model is estimated by Random effects model (REM) upon validation of the estimates. The final model is as presented in Table 2 below;

Table 2: Regression Results for Cross Sectional Standard Deviation

	CSSD
DU	1.675 (5.24)**
DL	2.588 (114.48)**
Constant	-4.215 (8.07)**
SD within	2.68
SD between	2.14
Variance across panels	0.61
N	4,79

* $p < 0.05$; ** $p < 0.01$

The coefficients are in bold; the t statistics are in parenthesis.

All the coefficients are statistically significant since their p-values are 0.000 and none of their confidence intervals includes zero. The overall regression fit is significant. This is because Prob> chi2 is less than 0.05. The standard deviation of residuals within groups is 2.676 (sigma_u) and the standard deviation of residuals between groups is 2.141 (sigma_e). 60.97% of the variance is attributable to the differences across the panels. There is no correlation between the error terms and the regressors. The positive signs of the regressors and their statistical significance indicates that there is significant herding as earlier suggested by Christie and Huang (1995) among other studies. The results of CSSD

and correspondingly has an impact on the return and risk of the stock (Tan et. al, 2008; Seetharaman and Raj, 2011).

regression correspond to apriori expectations. This indicates that there is herding in the market. Moreover, the graphical illustration (Figure 2) shows that there is herding in the stock market.

Conclusions and Recommendations

Conclusions

The fluctuations as demonstrated by figure 1, demonstrates existence of volatility at NSE while those of figure 2 show evidence that herding is prevalent at the NSE. Studies by Christie and Huang (1995) do suggest that the cross sectional standard deviation (CSSD) demonstrates the presence of herding. This study therefore concludes that herding pattern is not only evident but also significant amongst the listed firms at the NSE. Both individual and institutional investors confirm the prevalence of herding within their specific trading boundaries. In any market, current and potential investors including any other stakeholders are interested in its performance over better and appreciative returns on investments. This study considers herding as the most sensitive behaviour especially in situations where diversification of trading mechanisms are prevalent and there is ease of access to information by majority of potential, current and future investors. CSSD validated estimates and demonstrate the implication of herding in the stock price changes. The significant herding which influences the stock price movement is indicated by the positive signs of the regressors. Failure by Kenya to register an increase through NSE in the market capitalization in the year 2009 could be attributed to herding and thus being ranked fifth in the African stock exchange.

Based on the above discussions of the findings, the study conclude that herding behaviour

exists at the NSE as suggested by the literature and confirmed by the CSSD model used by the study. Due to the number of trading firms, the low volume of transactions among others, the study expect this behaviour of herding patterns as a contributory factor to volatility since it is sensitive among potential investors. For example, stocks rose among Kenyans, especially with the recent initial public offerings (IPOs) of state companies were oversubscribed indicating a healthy interest in the stock market. Consequently, the securities exchange has had cyclical business periods over the years translating to volatility. Therefore, with consideration of the results, the study also concludes that market participants contributes to the herding patterns with the expansive and positive fluctuations, which leads up to a non-linear relationship between the estimating model and the average market returns.

Recommendations

Herding is an important issue at the NSE especially to institutional investors, fund managers individual investors. This study suggests that the market participants (firms) and those not yet listed to be informed in advance the market expectations to discourage or reduce herding as this contributes to market inefficiencies in terms of stock market volatilities. Stock market parameters are of major concern to the policymakers as they are considered as the important indicators of economic activity. The study results attributes herding pattern experienced at NSE is linked to particular periods which results to speculations in the market. In order to ensure market efficiency, stock market regulators should consider these sensitive implications

while developing policies. For example, merging of trading policies at will or without any intense considerations in emerging markets may have dire implications for the stock market in relation to efficiency as herding might systematically lead to mispricing of the financial assets and stimulation of asset instabilities. Therefore, the government and policy makers should take herding into consideration as this behaviour may spur unnecessary volatility which is likely to destabilise the market and increase the fragility of the financial system. Volatility and abnormal information flows impede the reliability and accuracy of investment prediction. Finally, it is suggested that a number of enterprises including government owned enterprises should be encouraged to trade in the NSE enhance public participation in an effort to stabilise stock prices. Without continuous support from public participation aggravated by inadequate public confidence, firms will keep reducing or moving out and general status of securities exchange within the country will be collapsing and this can lead to dis-inclusion in the African stock market. Therefore, investors and policy makers collaboratively should consider providing clear information prior to critical purchases. Therefore, to be reliable and timely information need to be signalled by the government. If no signal is sent to the market, asymmetric information will eventually result in adverse selection in the market. This maintains market conditions so as to avoid negative returns due to possible irrational behaviour on speculative purchasing patterns. This will promote continuous and systematic transactions; a fundamental factor to the stability in the NSE.

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